REMARKS

Claims 1-24, 47-51 and 57-59 are pending in the application. With this response, no claims are amended, added, or cancelled.

Claims 47-51 and 59 have been allowed.

Claims 1-24, 47-51, and 57-59 remain pending in the application.

Reconsideration and allowance of these claims are respectfully requested.

Rejection Under 35 U.S.C. 102

Claims 1, 5, 7-9, 16-24 and 57 are rejected under 35 U.S.C. § 102(e) as purportedly being anticipated by Carlson (U.S. Patent 6,488,721).

The rejection is traversed.

The Carlson Reference

The Carlson reference relates to electrochemical cells prepared from components that include separator 102, edge insulating layer 301, and cathode active layer 201, among other known battery components.

The cell is prepared with the use of a "temporary carrier substrate" 2 onto which is placed separator 102 (i.e., "microporous separator layer") and edge material 301. Other components of the cell are then added by processing into a "cell stack" of battery components. The temporary carrier substrate 2 is removed and the remaining cell stack is formed into a roll without temporary carrier substrate 2, but with other components <u>including separator 102</u>. From Carlson, column 24, lines 13-26:

> Referring to FIG. 5, in an edge insulating layer coating step 62, an edge insulating layer 301 is coated onto the outer surface of the microporous separator layer 102 of composite 12 comprising cathode active layer 201, microporous separator layer 102, and temporary carrier substrate 2, which composite 12 may be prepared by the method illustrated in FIG. 1. This forms composite 24 comprising cathode active layer 201, edge insulating layer 301, microporous separator layer 102, and temporary carrier substrate 2. Next, in a temporary carrier substrate removing step 70, the temporary carrier substrate 2 is removed from the microporous separator layer 102 of composite 24 to form cathode/separator assembly 25 comprising cathode active layer 201, edge insulating layer 301, and microporous separator layer 102.

In the Carlson description, the "temporary carrier substrate" is a film used to coat the battery components onto, then is removed from the battery components. An example of a "temporary carrier substrate" given by Carlson is a substrate coated with a release agent such as a silicone release agent. See Carlson at column 16, line 65 through column 17, line 1.

Separator 102 is an integral part of the battery component of Carlson and is not released from battery components but becomes part of the Carlson electrochemical cell, e.g., "multilayer stack," which includes separator 102. See Carlson at column 32, lines 24-31, referring to figure 10:

> Next, in a winding step 110, combination 38 is wound, stacked, or otherwise combined to form an anode-electrode insulating layer-cathode/separator assembly multilayer cell stack 39. Following this step 110, in an electrolyte filling and sealing step 120, multilayer cell stack 39 is provided with electrolyte in pores of the separator and is further provided with a casing 200 which is sealed around the cell stack to form electrochemical cell 210

Separator 102 is a "microporous" layer of cell stack 39 and becomes a functional component of an electrochemical cell produced according to Carlson. According to Carlson, separator 102 includes a "microporous separator layer" such as a "xerogel" layer containing:

> a dried microporous three-dimensional solid gel network with pores which are interconnected in a substantially continuous fashion.

See, e.g., Carlson at column 13, lines 20 through 37.

The particular properties of the microporous, e.g., xerogel, separator layer, are of importance to Carlson, as shown by the Carlson description from the bottom of column 12 through column 16, line 51. In those nearly four full columns, Carlson discusses the microporous battery separator in terms of average pore diameter, the presence of a three-dimensional network of pores, necessary conductivity and insulating properties of the battery separator layer, pore volume of a microporous xerogel layer, advantages of

smaller pores (e.g., "nanopores"), and optional binders in the microporous separator layer.

Included in the microporous material of the battery separator is electrolyte. See, e.g., column 27, lines 61 and 62. The electrolyte provides ion transport, as is known in the battery arts:

> The electrolyte used in the cells of the present invention functions as a medium for storage and transport of ions, and may be any of the types of electrolytes known in the art of electrochemical cells. Any liquid, solid, solid-like gel material capable of storing and transporting ions may be used . . .

Carlson at column 18, lines 59 through 64.

To summarize, the battery separator layer 102 described by Carlson is a "microporous" layer that functions as would a known separator layer of electrochemical cells, to transport ions and provide functioning conductivity and insulating properties. The "temporary carrier substrate" of Carlson, exemplified as a silicone-release-coated substrate, is used during processing to carry battery components and is not part of the battery stack.

The Rejection of Claim 1 in view of Carlson

The rejection asserts that the battery separator 102 of Carlson is a "release liner" and therefore falls within claim 1:

> The separator thus functions as a substrate to the cathode material and is in direct contact therewith. The separator is made of an inorganic xerogel or an organic polymer material (see col. 12, line 60). Consequently, it is submitted that the separator is capable of functioning as a "release liner" as recited in claim 1.

According to, e.g., section 2111.01, of the Manual of Patent Examining Procedure the words of a claim must be given their plain meaning, as the term is used by those of ordinary skill. Equating a "battery separator" with a "release liner" is against standard interpretations of the term "release liner" and cannot stand.

With specific respect to the rejection of claim 1, the identification of a "battery separator" as a "release liner" is contrary to the Carlson description, contrary to the

normal meaning of "release liner" as used by the skilled artisan, and contrary to the meaning of the term "release liner" as used by Applicants.

The term "release liner" is understood to contemplate a cohesive film (e.g., paper or plastic) that has mechanical properties such as flexibility, rigidity, and relatively low elasticity, to be useful for applications such as for handling composites, contacting adhesives (e.g., adhesive tape), or for other useful purposes for contacting or handling materials. A surface may exhibit low-stick or non-stick properties based on the nature of the liner material or due to a surface coating thereon. Basic properties of a release liner are low or reduced stickiness and mechanical properties such as flexibility, low elasticity, etc., to provide support or processing functionality. This meaning of "release liner" is consistent with the usage of "release liner" in Applicant's patent specification and claims, is consistent with Applicant's use of this term during prosecution of the pending claims, and is consistent with patent documents cited by Applicants during prosecution: U.S. Patent Nos. 5,178,924, 5,445,609, and 6,143,216. (See page 13 of Applicant's Response filed April 6, 2005). The term is not normally used to describe separator layers of a battery.

To the contrary, the assertion that a battery separator can fall within the definition of a "release liner" is against the standard meaning of the term "release liner," and is also in conflict with the Carlson reference. The Carlson description contemplates the use of a "release liner," i.e., as one example of the described "temporary carrier substrate" 2. See Carlson, e.g., at column 16 line 52 through column 17, line 16 (emphasis added):

> In the methods of preparing a cathode/separator assembly of the present invention, the temporary carrier substrate functions as a temporary support to the superposed layers during the process steps of this invention and may be any web or sheet material possessing suitable smoothness, flexibility, dimensional stability, and adherence properties to the cathode/separator assembly. In one embodiment of the methods of preparing a cathode/separator assembly of the present invention, the temporary carrier substrate is a flexible web substrate. Suitable web substrates include, but are not limited to, papers, polymeric films, and metals. <u>A typical flexible polymeric film for use as the temporary carrier substrate is a polyethylene terephthalate film.</u> In a preferred embodiment, the flexible web substrate is <u>surface treated with a release agent</u> to enhance desired release characteristics, such as by treatment with a <u>silicone release agent</u> and the like. This surface treatment or coating with a release agent of the temporary

> carrier substrate may be done on a multistation coating machine in the same coating pass as that used to later apply the first layer of the cathode/separator assembly in the methods of this invention. Thus for example, referring to FIG. 1, in one embodiment of the methods of the present invention, the coating step of coating the temporary carrier substrate with a release agent would occur prior to the microporous separator coating step 50. Examples of suitable flexible web substrates include, but are not limited to, resin-coated papers such as papers on which a polymer of an olefin containing 2 to 10 carbon atoms, such as polyethylene, is coated or laminated; and transparent or opaque polymeric films such as polyesters, polypropylene, polystyrene, polycarbonates, polyvinyl chloride, polyvinyl fluoride, polyacrylates, and cellulose acetate.

In addition to the temporary carrier substrate (e.g., "release liner"), Carlson also identifies a battery separator, which is a different component (not a "release liner" or temporary carrier substrate") that is coated onto the substrate. Carlson does not equate a release liner with a separator, but instead distinguishes release liners and battery separators as different components useful in preparing an electrochemical cell, and having different properties and functions. The Carlson battery separator is a layer of the electrochemical cell chosen to provide ion transport and insulation (conductivity) properties; the release liner (as an example of a "temporary carrier substrate") is for temporarily processing a stack of battery components including the battery separator, and for removal following that processing. The Carlson temporary carrier substrate is selected for mechanical and handling properties: "smoothness, flexibility, dimensional stability, and adherence properties."

Carlson distinguishes between a "temporary carrier substrate" or "release liner" and a battery separator, and does not equate the two. To equate these two different elements of the Carlson description is inconsistent with the overall description of Carlson.

The assertion that the "battery separator" of Carlson is a "release liner" as recited in Applicants' claim 1 is untenable and will not withstand appeal. The rejection of claim 1 on this basis should be withdrawn. The rejection of claims 5, 7-9, 16-24 and 57, all of which are dependent on claim 1, should similarly be withdrawn.

<u>Rejection Under 35 U.S.C. 103</u>

<u>Carlson in view of Liu et al.</u>

Claims 2-4 and 10-15 are rejected under 35 U.S.C. 103(a) as purportedly being unpatentable over Carlson (US 6,488,721) in view of Liu et al. (US 6,159,544).

According to the rejection: "Carlson is applied to claims 1, 5, 7-9, 16-24, and 57 for the reasons stated above."

This rejection under 35 U.S.C. § 103 is based on the premise that the "<u>battery separator</u>" of Carlson is a <u>release liner</u>. Because the Carlson battery separator is not a release liner, the Office action lacks support for the outstanding rejection of claims 1, 5, 7-9, 16-24, and 57, and consequently lacks support for the rejection of claims 2-4 and 10-15, based on Carlson in view of Liu et al. In view of the mis-interpretation of the term "release liner" to erroneously include a battery separator, the Office action has not presented a basis for the obviousness of the "release liner" feature of claim 1.

The claim features and prior art descriptions found at page four of the Office action relate to other features of the pending claims, and are moot.

Because the Carlson battery separator is not a release liner, as presupposed by the rejection under § 103 in view of Carlson and Liu et al., the rejection of claims 2-4 and 10-15, in view of Carlson and Liu et al., is based on an unsound premise and should be withdrawn.

<u>Carlson in view of Hommura et al., and Claim 1</u>

Claim 1 is rejected under 35 U.S.C. § 102(e) as purportedly being anticipated by Carlson (U.S. Patent 6,488,721) in view of Hommura et al. (U.S. Patent 6,458,490). (While the language used in the Office action at the first sentence of paragraph 4 is "anticipated" (i.e., a rejection under section 102) Applicants have addressed the rejection of paragraph 4, at page 5 of the Office action as a rejection under section 103, based on obviousness, be the balance of the rejection seems to be presented in terms of obviousness.) If this is incorrect, an appropriate correction and a new period for reply are respectfully requested.

> According to the rejection:
>
> Carlson is applied to claim 1 for the reasons stated in section 2 above. However, Carlson does not expressly teach that the separator (i.e., the claimed "substrate") is made of paper, as recited in claim 1.
>
> . . .
>
> the artisan would have been motivated to use the paper separator of Hommura et al., as the separator of Carlson.

The rejection is traversed. One of skill would not have been motivated to use a paper battery separator of Hommura et al., as the Carlson battery separator.

Carlson understood that paper battery separators were available, and does not indicate that paper separators are useful as "microporous separators." As "Background" Carlson states:

> A variety of materials have been used for the porous layer or separator of the electrolyte element in electrochemical cells. These porous separator materials include polyethylenes and polypropylenes, glass fiber and <u>paper</u> filter papers, and ceramic materials. (emphasis mine.)

Carlson at column 1, lines 60-64. Carlson's invention is identified as relating to the use of a "microporous separator layer":

> The present invention pertains to methods of preparing a cathode/separator assembly for use in an electrochemical cell, wherein the cathode assembly comprises a cathode active layer and a microporous separator layer, . . .

Carlson at column 3, lines 34-37. When discussing the "<u>microporous</u> separator layer," Carlson does not identify <u>paper</u> as a useful material:

> The term 'microporous' as used herein, pertains to the material of a layer, which material possesses pores of diameter of about 1 micron or less which are interconnected in a substantially continuous fashion from one outermost surface of the layer through to the other outermost surface of the layer. . . . Examples of microporous materials useful in the microporous separator layer of the methods of the present invention include, but are not limited to, inorganic xerogel layers or films, inorganic xerogel layers or films further comprising an organic polymer, and organic polymer layers or films that undergo vesiculation or pore formation upon gas formation, for example, by heating or photoirradiating an aromatic diazonium compound or other gas forming compound.

Carlson at column 12, lines 49-65.

Carlson's microporous separator materials (e.g., a xerogel) are described as inorganic gels and organic polymeric materials selected because of their porosity properties, including properties such as average pore diameter, the three-dimensional network of pores, pore volume of a microporous xerogel layer, advantages of smaller pores (e.g., "nanopores"), and also based on necessary conductivity and insulating properties of the battery separator layer. See, e.g., Carlson at the bottom of column 12 through column 16, line 51. Nothing in the Carlson or Hommura et al., references has been cited to indicate that these properties of the microporous battery separator can be achieved by the paper separator of Hommura et al.

As for the description of Hommura et al., they prefer paper over "small-pore" polyolefin separators:

> The small-pore polyolefin film for use in the separator of the nonaqueous electrolyte secondary battery which requires a complicated manufacturing process encounters a problem in that the cost cannot be reduced.

Hommura et al., at column 1, lines 56-60. As a solution to high-cost small-pore materials, Hommura et al., select paper. But, there is no indication that the paper of Hommura et al., will exhibit the microporous properties described by Carlson.

Consequently, except for Examiner's conclusion of obviousness, there is no suggestion of replacing the Carlson microporous separator with a paper separator such as that of Hommura et al., and the rejection of claim 1 in view of this combination of references should be withdrawn.

Carlson in view of Yamaguchi et al. and Claim 58

Claim 58 is rejected under 35 U.S.C. 103(a) as purportedly being unpatentable over Carlson in view of Yamaguchi et al. (U.S. Publication No. 2002/0037458).

Claim 58 relates to Applicants' method, wherein the substrate is aluminum foil, copper foil, or a silicone release liner.

According to the rejection:

> Carlson is applied to claims 1, 5, 7-9, 16-24, and 57 for the reasons stated above. Further, the reference teaches . . . that the solid electrolyte may comprise polyethylene oxide, polypropylene oxide, and polyacrylonitrile, among other materials.

. . .

> the [Carlson] reference does not expressly teach that the separator/solid electrolyte (i.e., the release liner) comprises silicone as recited in claim 58.

. . .

> Yamaguchi et al. is directed to a nonaqueous electrolyte battery. . . . [T]he reference teaches a solid polymer electrolyte that may contain silicone . . .

. . .

> As such, the artisan would be sufficiently skilled to use the silicone of Yamaguchi as the electrolyte of Carlson et al.

The rejection is traversed.

The Examiner asserts that one of skill would have been motivated to use a silicone conductive polymer of Yamaguchi et al., for the electrolyte of Carlson, in preparing the Carlson battery separator. Applicants do not necessarily agree with this conclusion, but accepting the conclusion *arguendo* for the limited purpose of this response, even if the proposed conclusion were true, the result of the proposed combination still would not result in the invention of claim 58.

If it could be shown that one of skill would have substituted the silicone of Yamaguchi et al. for the electrolyte of the Carlson battery separator, a resultant silicone-electrolyte-containing battery separator is still a battery *separator* and is still not a *release liner* as recited in claim 58.

Claim 58 (dependent on claim 1) recites coating edge material and cathode material to contact a surface of a substrate wherein the substrate is for example a silicone release liner.

The Yamaguchi et al. silicone-containing electrolyte does not constitute a silicone release liner as recited in claim 58. If a silicone electrolyte identified by Yamaguchi et al. were included in the battery separator of Carlson, the Carlson battery separator would still be a battery separator and not a silicone release liner.

The factual distinction between a battery separator (silicone-containing or not) and a silicone release liner, is shown above and is indisputable. A battery separator having conductivity and ion transport properties is not designed to exhibit mechanical and anti-stick properties of a silicone release liner, e.g., useful for handling and processing other coated or adhesive materials. This holds true even if the separator includes a silicone component; the presence of silicone alone is not the only necessary feature of a silicone release liner. As a consequence, even if one of skill would have been motivated to modify Carlson to use a silicone electrolyte such as that of Yamaguchi et al., the result still would not be a construction of Applicant's claim 58, which requires, *inter alia*, a silicone release liner, not a silicone-electrolyte-containing battery separator.

The rejection of claim 58 based on Carlson and Yamaguchi et al. is unsound in that a silicone electrolyte in the battery separator of Carlson still would not result in a silicone release liner. The proposed combination, even if legitimate, would not result in the features of claim 58, which requires a silicone release liner and not a silicone-electrolyte-containing battery separator. The rejection of claim 58 based on the stated grounds will not withstand an appeal and should be withdrawn.

Allowable Subject Matter

Applicants acknowledge with appreciation the Examiner's indication that claims 47-51 and 59 are allowed. These claims remain in the application for issuance.

Claim 6 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form. Because Applicant's believe that claim 1 upon which claim 6 depends, is patentable, Applicant's have not amended claim 6 to be in independent form.

Conclusion

Pending claims 1-24, 47-51 and 57-59 are believed to be in condition for allowance and can pass to issuance.

The Examiner is invited to contact the undersigned, at the Examiner's convenience, should the Examiner have any questions regarding this communication or the present patent application.

Respectfully Submitted,

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Dated: Dec. 8, 2005

DCS#21680v2